

299-E13-61 (A5876) Log Data Report

Borehole Information:

Borehole: 299-E13-61 (A5876)		Site: 216-B-53A Trench			
Coordinates (WA State Plane)		GWL (ft)¹: Not deep enough		GWL Date: 10/09/03	
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
134,448.46 m	573,218.66 m	Sept. 1982	228.045 m	50	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	2	8 5/8	8	5/16	+2	50
The logging engineer measured the casing stickup using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape. Measurements were rounded to the nearest 1/16 in. Casing thickness was calculated.						

Borehole Notes:

Borehole coordinates, elevation, and borehole construction information are from measurements by Stoller field personnel, HWIS³, and Chamness and Merz (1993). Zero reference is the top of the 8-in. casing. On the ground surface, a 2-ft-diameter grout seal with an identification marker surrounds the casing. Chamness and Merz (1993) reported that the borehole was grouted.

Logging Equipment Information:

Logging System:	Gamma 1E	Type:	70% HPGe (34TP40587A)
Calibration Date:	7/2003	Calibration Reference:	GJO-2003-468-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2/Repeat	3	4	
Date	10/09/03	10/13/03	10/13/03		
Logging Engineer	Spatz	Spatz	Spatz		
Start Depth (ft)	48.0	25.0	16.0		
Finish Depth (ft)	17.0	17.0	2.0		
Count Time (sec)	100	100	100		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A ⁴	N/A	N/A		
Pre-Verification	AE046CAB	AE048CAB	AE048CAB		
Start File	AE047000	AE048000	AE048009		

Log Run	1	2/Repeat	3	4	
Finish File	AE047031	AE048008	AE048023		
Post-Verification	AE047CAA	AE048CAA	AE048CAA		
Depth Return Error (in.)	0	N/A	0		
Comments	Fine-gain adjustment made before logging.	Repeat section.	No fine-gain adjustment.		

Logging Operation Notes:

Zero reference was top of the 8-in. casing. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K , ^{238}U , and ^{232}Th) verifier with serial number 118. Maximum logging depth achieved was 48 ft.

Analysis Notes:

Analyst:	Sobczyk	Date:	10/28/03	Reference:	GJO-HGLP 1.6.3, Rev. 0
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SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 2.3 percent lower and 1.5 percent higher at the end of the day. Examinations of spectra indicate that the detector appears to have functioned normally during logging, and the spectra are accepted.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The pre-run verification spectra were used to determine the energy and resolution calibration for processing the SGLS data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1EJul03.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 8-in. casing. On the basis of Chamness and Merz (1993), the casing configuration was assumed to be one string of 8-in. casing to the maximum depth of the logging (48 ft). The casing correction factor was calculated assuming a casing thickness of 5/16 in. The logging engineer measured this casing thickness in the field. Water and dead time corrections were not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. In addition, a comparison log plot of man-made radionuclides is provided to compare the data collected in 1999 by Waste Management Federal Services Northwest's Radionuclide Logging System (RLS) with SGLS data. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs and ^{60}Co were the man-made radionuclides detected in this borehole. ^{137}Cs was detected in the intervals between 5 and 7 ft and between 19 and 21 ft. The range of concentrations was from the MDL (0.2 pCi/g) to 1.1 pCi/g, which was measured at 20 ft. ^{137}Cs was also detected at 14 ft and 32 ft with a concentration near the MDL. ^{60}Co was detected in the interval from 20 to 23 ft. The range of concentrations was from the MDL (0.1 pCi/g) to 0.3 pCi/g, which was measured at 22 ft. ^{60}Co was also detected at 31 ft with a concentration near the MDL.

The presence of grout may have affected the KUT response in this borehole. Chamness and Merz (1993) reported that this borehole had been grouted, but no other details were given.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the man-made radionuclides (662, 1173, and 1333 keV) and natural radionuclides (609, 1461, 1764, and 2614 keV). The ^{60}Co concentration based on the 1173-keV and 1333-keV photopeaks did not repeat at 23 ft.

Comparison log plots of data collected in 1999 by Waste Management Federal Services Northwest and in 2003 by Stoller are included. The RLS concentration data for ^{137}Cs and ^{60}Co are decayed to the date of the SGLS logging event in October 2003. Comparison of the ^{137}Cs and ^{60}Co concentrations indicates that the RLS and SGLS data appear to agree for these radionuclides. Since 1999, ^{137}Cs and ^{60}Co activities appear to have decreased as predicted by radioactive decay.

References:

Chamness, M.A., and J.K. Merz, 1993. *Hanford Wells*, PNL-8800, Pacific Northwest Laboratory, Richland, Washington.

¹ GWL – groundwater level

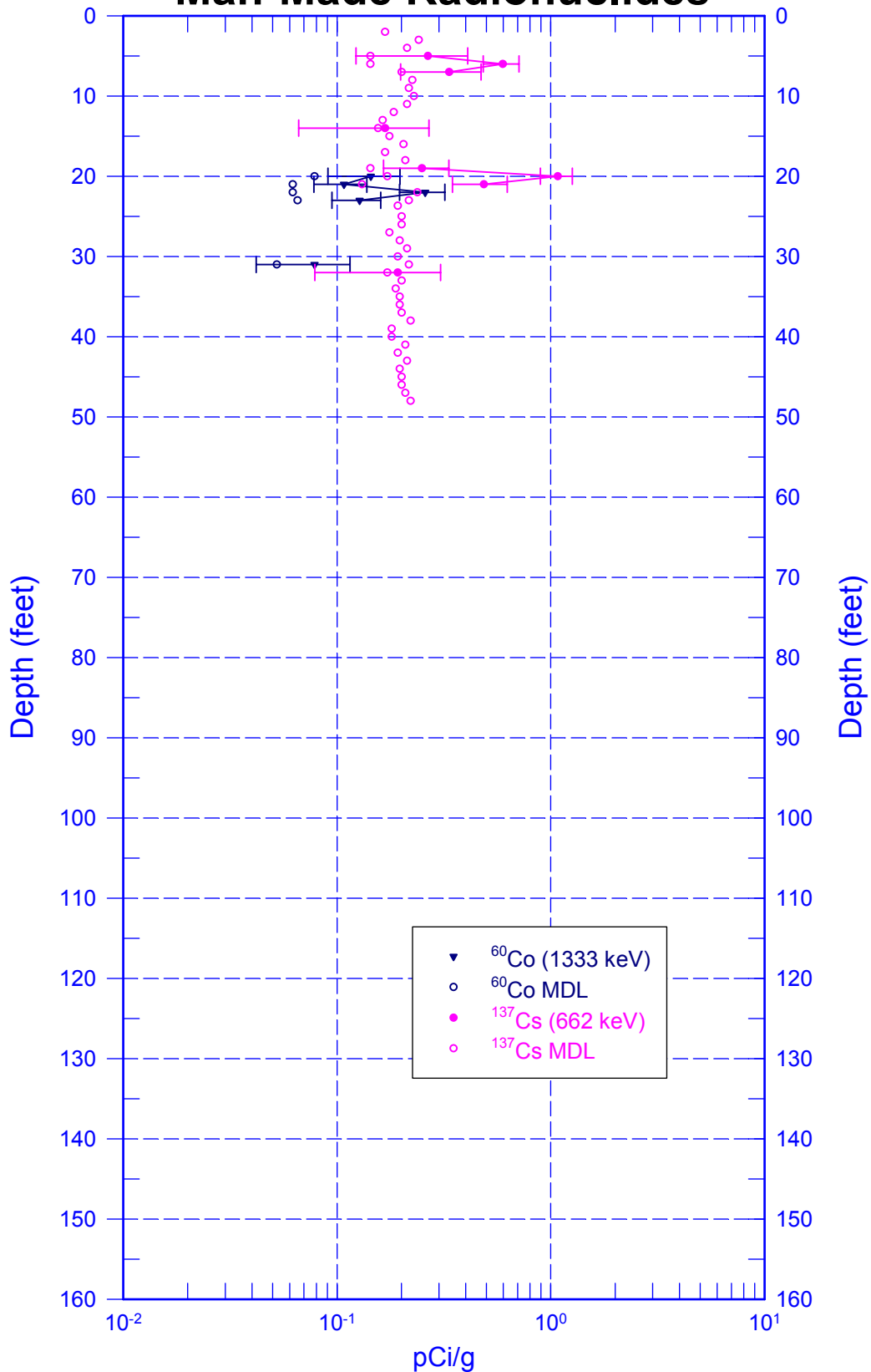
² TOC – top of casing

³ HWIS – Hanford Well Information System

⁴ N/A – not applicable

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Man-Made Radionuclides

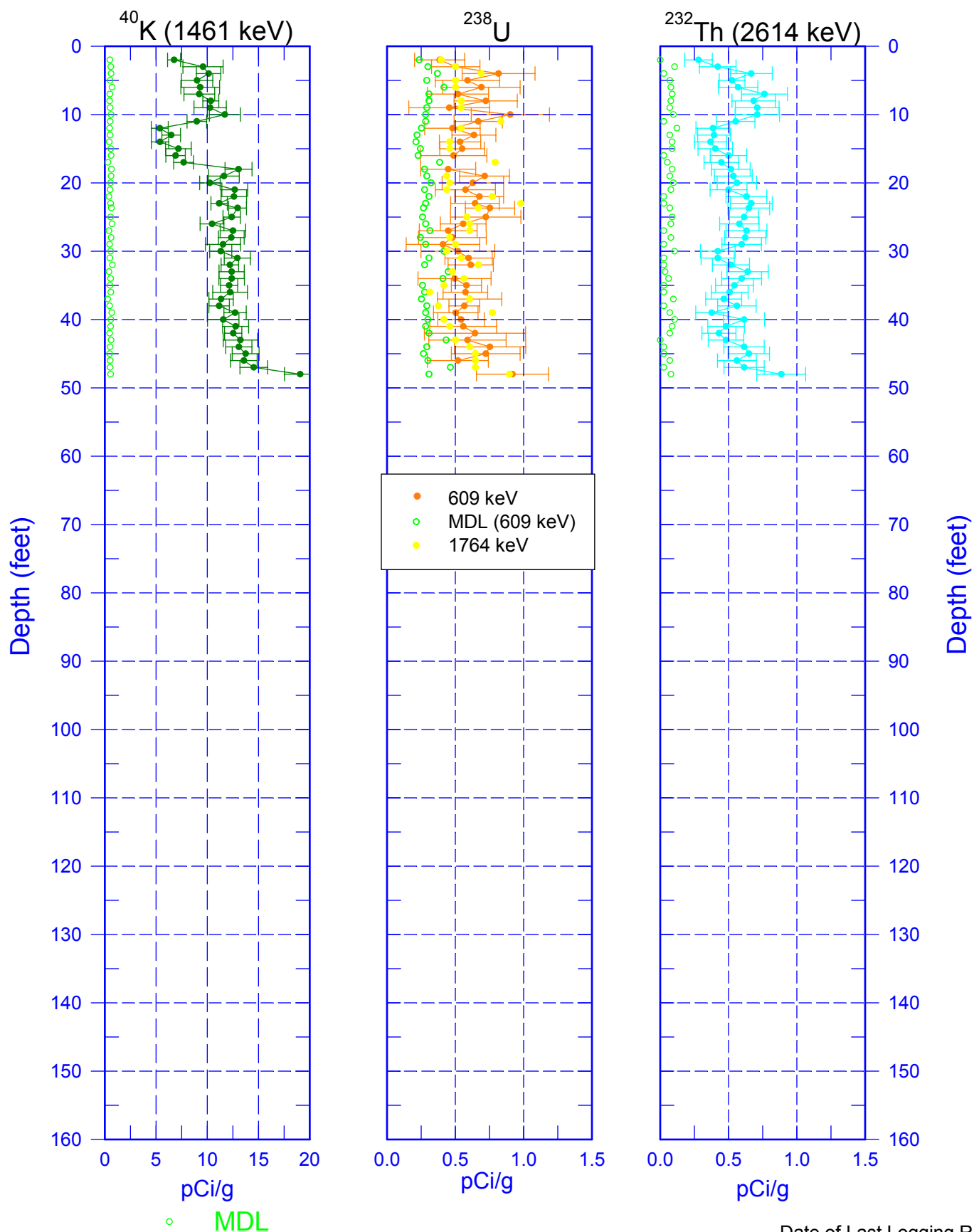


Zero Reference = Top of Casing

Date of Last Logging Run
10/13/2003

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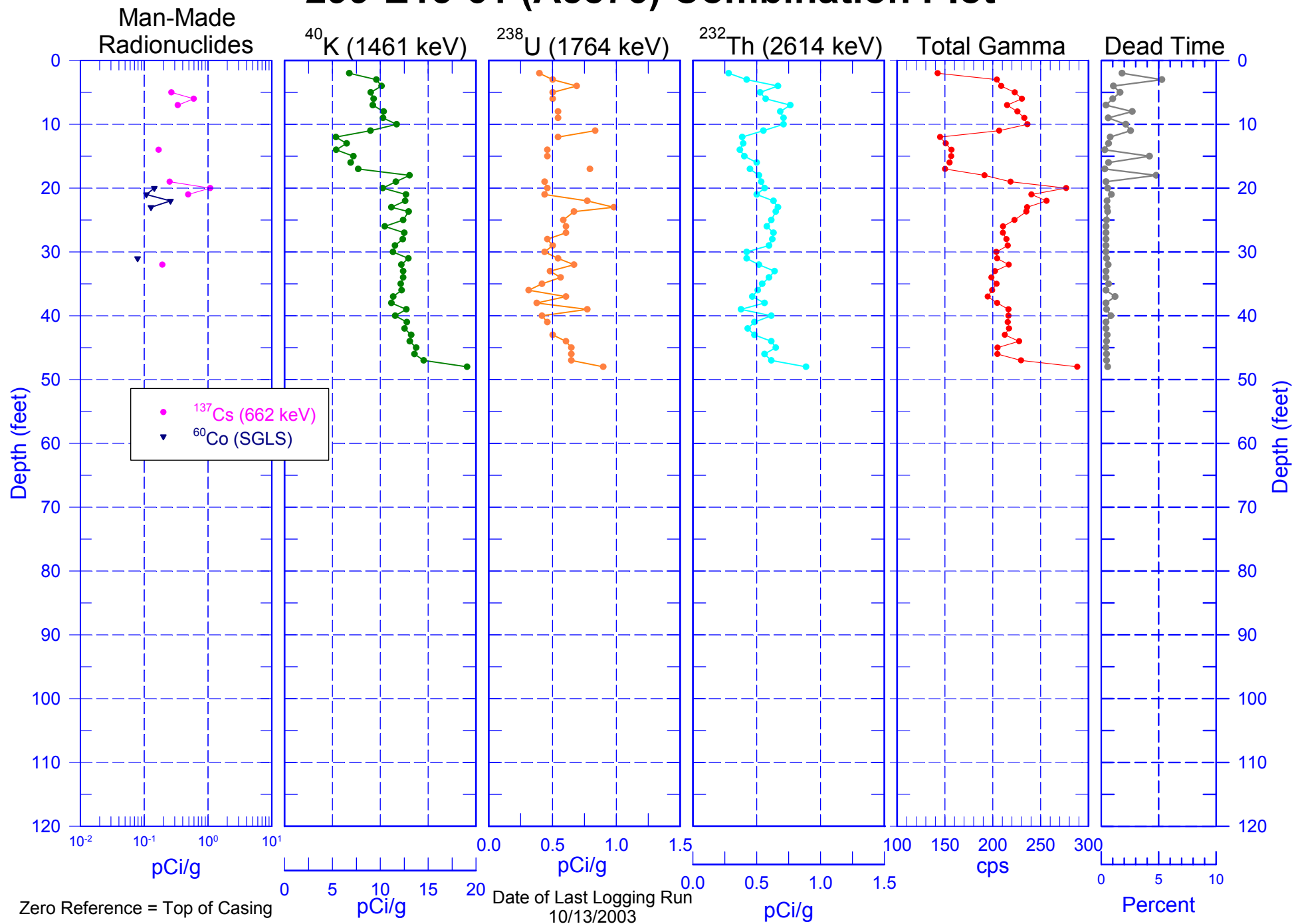
Natural Gamma Logs



Zero Reference = Top of Casing

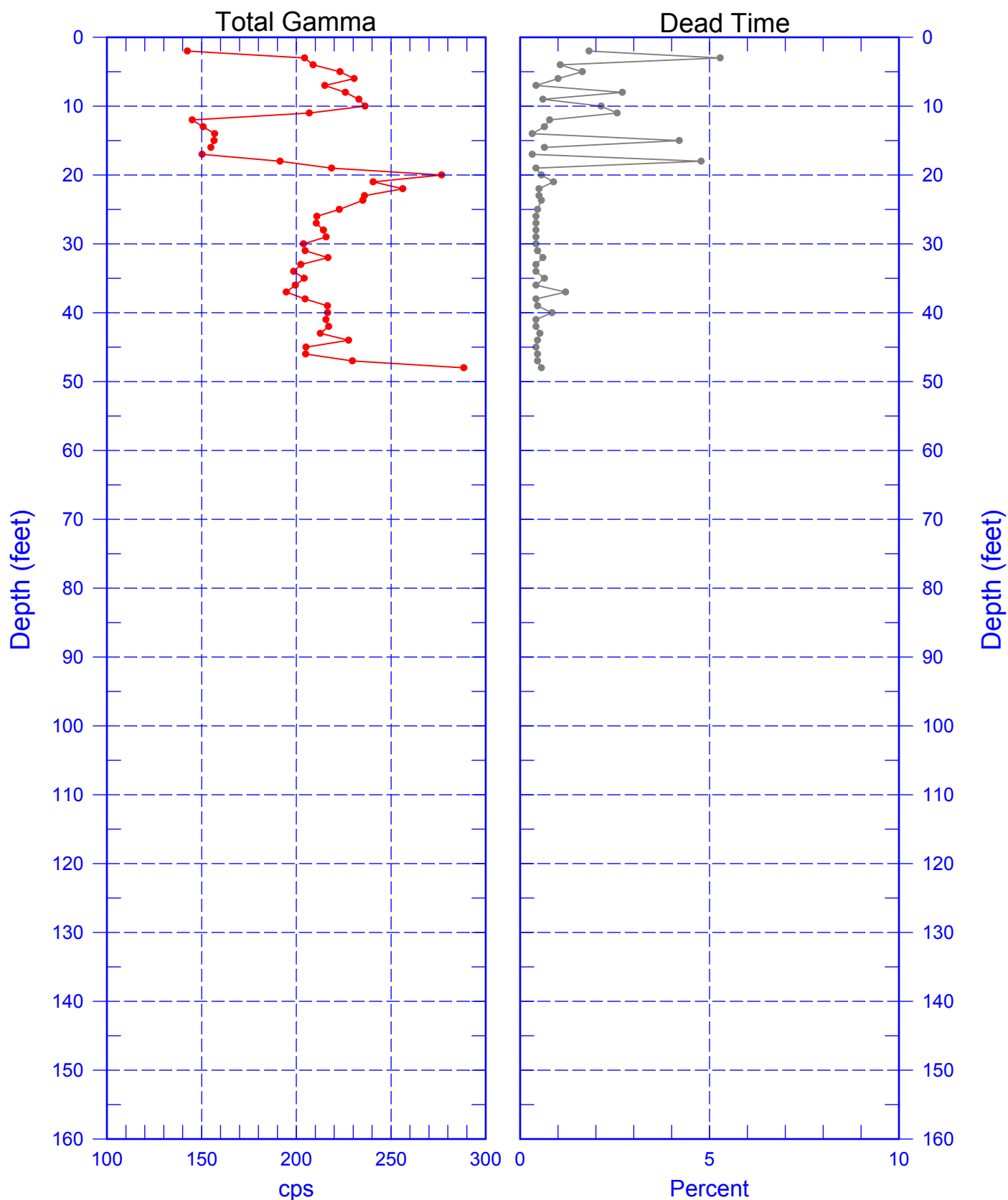
Date of Last Logging Run
10/13/2003

299-E13-61 (A5876) Combination Plot



299-E13-61 (A5876)

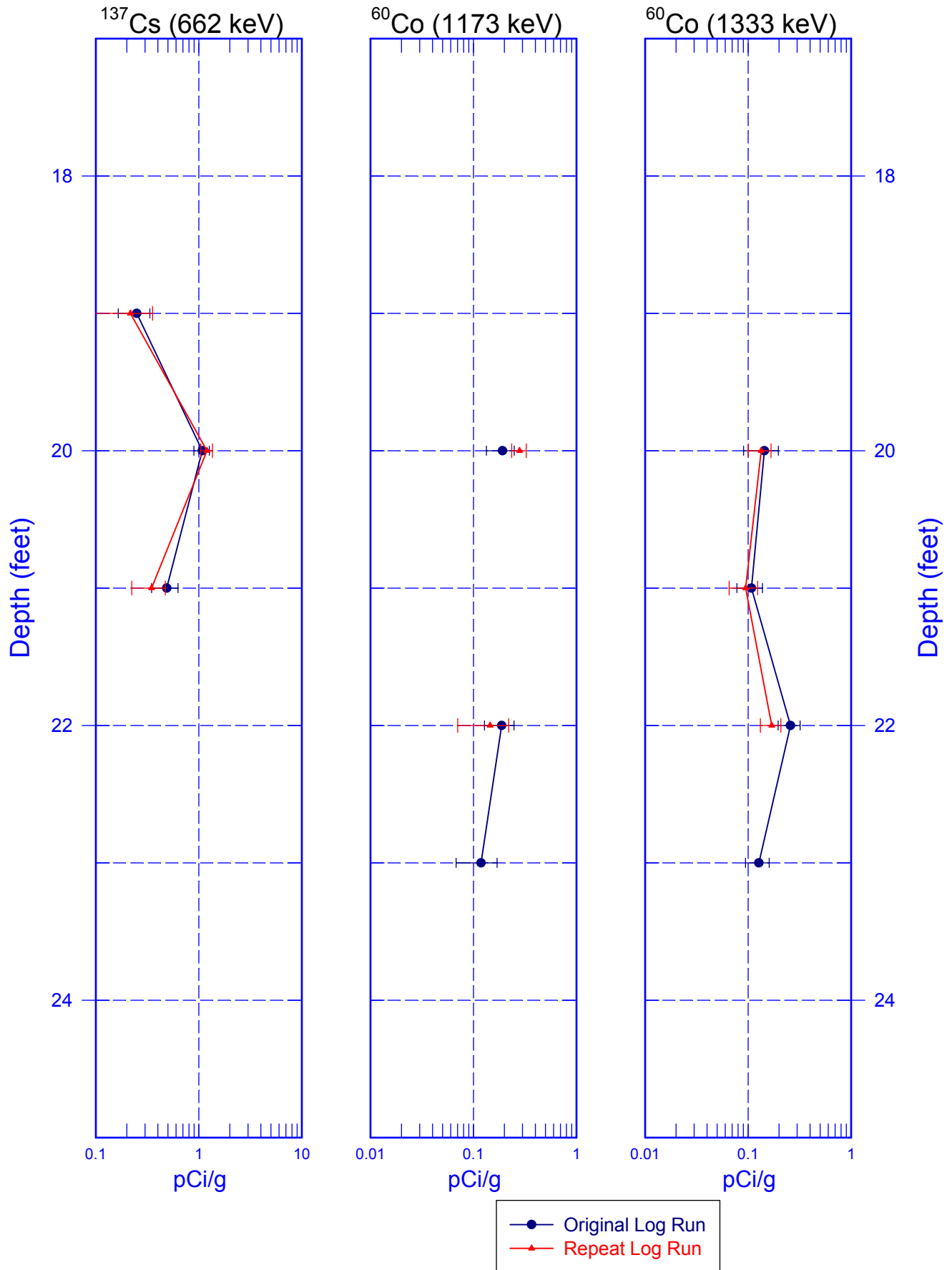
Total Gamma & Dead Time



Zero Reference = Top of Casing
Date of Last Logging Run
10/13/2003

299-E13-61 (A5876)

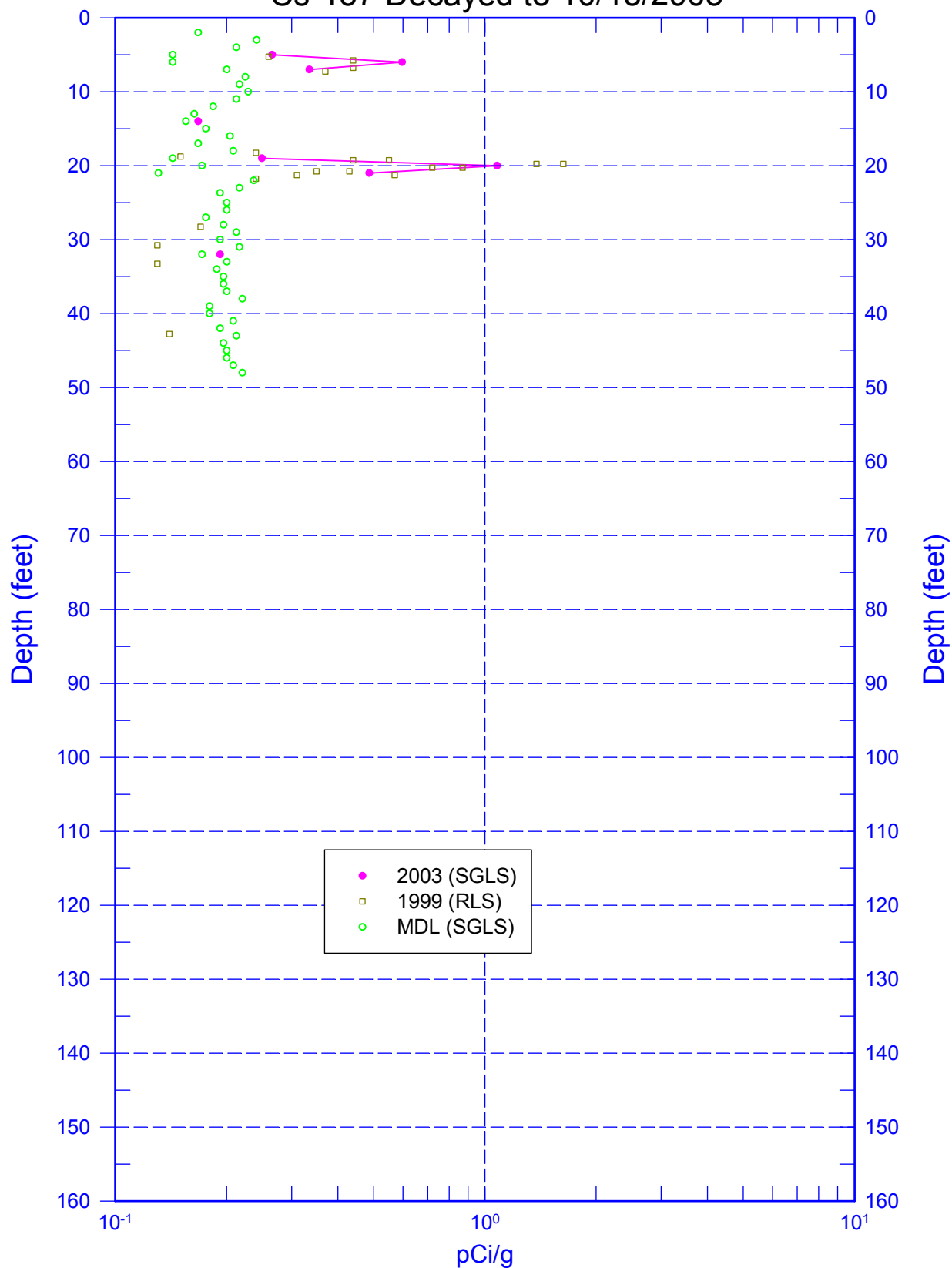
Rerun of Man-Made Radionuclides (25.0 to 17.0 ft)



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RLS Data Compared to SGLS Data

Cs-137 Decayed to 10/13/2003

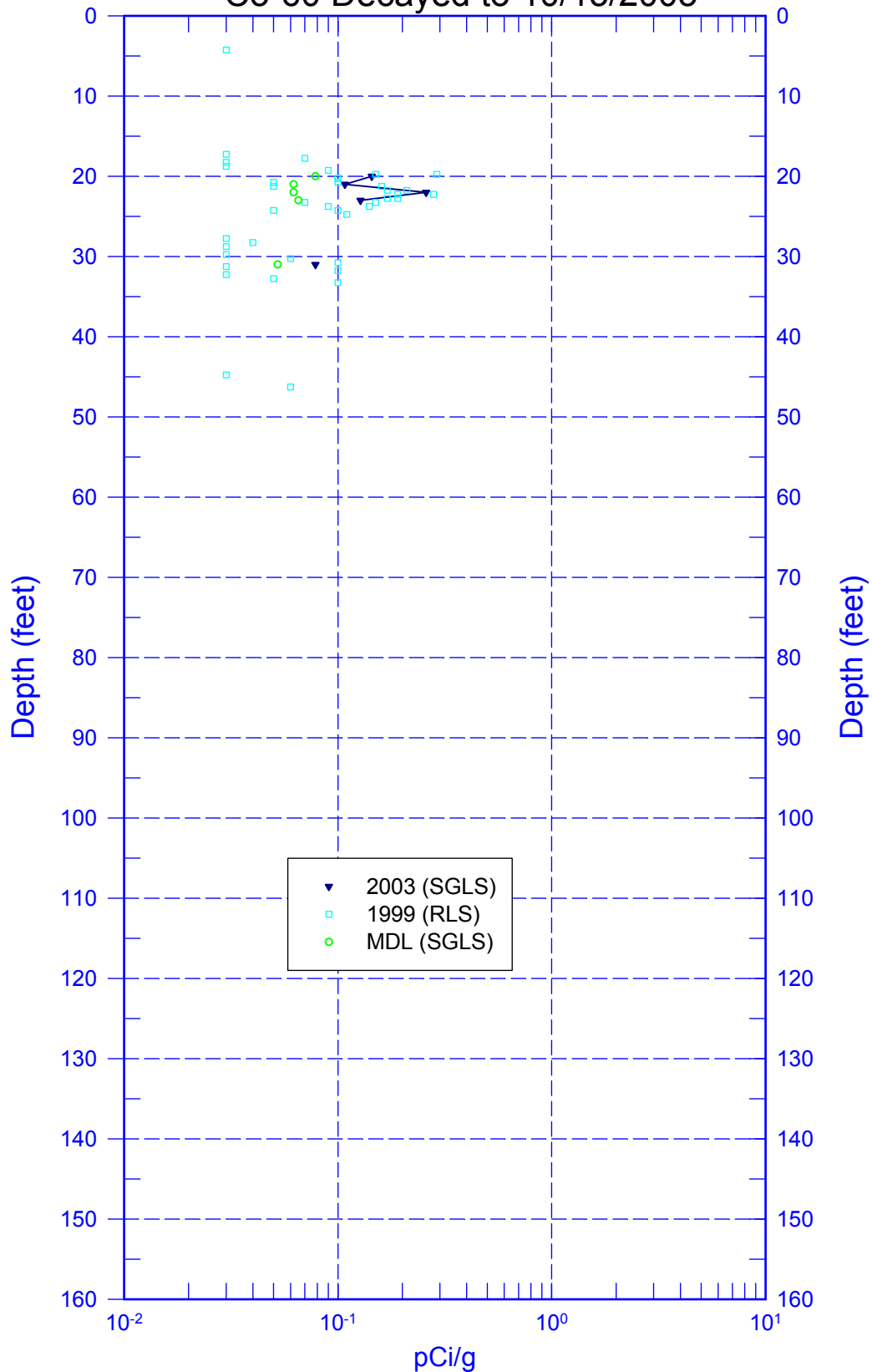


Zero Reference = Top of Casing (2003 SGLS & 1999 RLS)

299-E13-61 (A5876)

RLS Data Compared to SGLS Data

Co-60 Decayed to 10/13/2003



Zero Reference = Top of Casing (2003 SGLS & 1999 RLS)